

WHAT IS CLAIMED IS:

1. In a barrier operator for moving a barrier, such as a gate or garage door, between open and closed positions, said operator including a motor and a drive mechanism interconnecting said barrier with said motor, a control system for said operator for causing said barrier to move between open and closed positions including:

a base controller including a control circuit, a radio frequency base transmitter and a radio frequency base receiver operably connected to said control circuit for sending a radio frequency signal from said base transmitter in response to a signal from said control circuit, said control circuit being responsive to receiving a signal from said base receiver indicating a radio frequency signal received by said base receiver;

at least one remote control unit including a radio frequency remote receiver and a radio frequency remote transmitter operable for receiving radio frequency signals from said base transmitter and transmitting radio frequency signals to said base receiver; and

a signal processor operably associated with said control system for effecting automatic opening and closing of said barrier depending on the location of said remote control unit being within a predetermined range of said base transmitter.

2. The system set forth in Claim 1 including:
position sensing means for determining open and closed positions of said barrier, respectively and for generating a signal to said control circuit indicating whether said barrier is in an open condition or a closed condition.

3. The system set forth in Claim 1 including:

an obstruction detector for detecting the presence of an obstruction in the path of said barrier when said barrier is moving from an open position to a closed position.

4. A method for operating a barrier, such as a gate or garage door, to move between open and closed positions, said barrier being operably connected to an operator system including a controller comprising a base control circuit, a radio frequency base transmitter and a radio frequency base receiver and at least one remote control unit operable to communicate with said base control circuit, said remote control unit including a radio frequency remote transmitter and a radio frequency remote receiver, said method comprising the steps of:

causing said base transmitter to transmit a radio frequency signal to said remote receiver; and

causing said control circuit to effect one of opening and closing said barrier depending on whether or not said base receiver receives a signal from said remote transmitter.

5. The method set forth in Claim 4 including the steps of:

causing said remote receiver to effect operation of said remote transmitter to generate a remote radio frequency signal when said remote receiver receives a signal from said base transmitter; and

causing said operator system to open said barrier in response to said base receiver receiving said signal transmitted by said remote transmitter.

6. The method set forth in Claim 4 wherein:

said system includes a manual operating remote switch associated with said remote control unit and said method includes causing said controller to be responsive to a signal from said remote control unit initiated by actuation of said remote switch to effect one of opening and closing said barrier.

7. The method set forth in Claim 4 including the step of:

transmitting a radio frequency signal from said base transmitter at least periodically when said remote receiver is out of range until said base receiver receives a signal from said remote transmitter.

8. The method set forth in Claim 4 including the step of:

causing said barrier to move from a closed position to an open position in response to a signal from said remote transmitter and remaining in an open position as long as said remote receiver is within a signal receiving range of said base transmitter.

9. The method set forth in Claim 4 including the steps of:

causing said barrier to move from a closed position to an open position when said remote receiver is
5 within a predetermined range of said base transmitter, then causing said barrier to move from an open position to a closed position after said remote receiver moves out of said range of said base transmitter.

10. The method set forth in Claim 4 wherein:

said system includes a manually actuatable base switch for effecting operation of said controller to move said barrier toward one of an open and closed position and
5 said method includes the step of moving said barrier from one of said positions to the other upon actuation of said base switch.

11. The method set forth in Claim 10 including the step of:

causing said base transmitter to transmit a query signal to said remote receiver when said barrier is in a closed condition and said remote control unit is out of said
5 predetermined range.

12. The method set forth in Claim 10 including the step of:

ceasing periodic transmission of signals from said base transmitter when said barrier is in a closed condition
5 and said remote control unit is within said predetermined range.

13. The method set forth in Claim 10 including the step of:

ceasing transmission of signals from said base transmitter when said barrier is in an open condition as a
5 consequence of actuation of said manually actuatable base switch.

14. The method set forth in Claim 10 including the step of:

causing said barrier to move from an open condition to a closed condition when said remote control
5 unit is out of said predetermined range after a predetermined time delay based on a previous operation of said barrier.

15. The method set forth in Claim 10 including the step of:

causing said barrier to move to a closed condition from an open condition after a predetermined time delay
5 while said remote control unit is within said predetermined range as a consequence of actuation of said controller automatically or by actuation of said manually actuatable switch.

16. A method for operating a barrier, such as a gate or garage door, to move between open and closed positions, said barrier being operably connected to an operator system including a controller comprising a base control circuit, a human operator controllable base switch operably connected to said base control circuit, a base signal transmitter and a base signal receiver and at least one remote control unit operable to communicate with said base control circuit, said remote control unit including a remote signal transmitter and a remote signal receiver, said method comprising the steps of:

causing said barrier to move from one of said positions to the other upon actuation of said base switch;
causing said base transmitter to transmit a signal to said remote receiver; and
causing said control circuit to effect moving said barrier to said one position in response to said base receiver receiving a signal from said remote transmitter in response to said remote receiver receiving a signal from said base transmitter.

17. The method set forth in Claim 16 including the step of:

ceasing transmission of signals from said base transmitter when said barrier is in a closed condition and said remote control unit is within a predetermined range.

18. The method set forth in Claim 16 including the step of:

ceasing transmission of signals from said base transmitter when said barrier is in an open condition as a consequence of actuation of said base switch.

19. The method set forth in Claim 16 including the step of:

causing said barrier to move from an open condition to a closed condition when said remote control unit is out of a predetermined range after a predetermined time delay based on a previous operation of said barrier.

20. The method set forth in Claim 16 including the step of:

causing said barrier to move to a closed condition from an open condition after a predetermined time delay while said remote control unit is within a predetermined range as a consequence of actuation of said controller automatically or by actuation of said manually actuatable switch.

21. A method for operating a barrier, such as a gate or garage door, to move between open and closed positions, said barrier being operably connected to an operator system including a controller comprising a base control circuit, a human operator controllable base switch operably connected to said base control circuit, a radio frequency base transmitter and a radio frequency base receiver and plural remote control units operable to communicate with said base control circuit by way of said base receiver, each of said remote control units including a radio frequency remote transmitter and a radio frequency remote receiver, said method comprising the steps of:

causing said base transmitter to transmit a radio frequency signal to said remote receivers; and
causing said base control circuit to effect one of opening and closing said barrier dependent on said base receiver receiving signals from said remote transmitters.

22. The method set forth in Claim 21 including the steps of:

actuating said base switch to effect closing of said barrier;

5 causing said controller to determine if all of said remote control units are within a range of said controller effective to receive signals from each of said remote transmitters; and

10 causing said base transmitter to cease transmitting signals to said remote receivers if all of said remote control units are within said range.

23. The method set forth in Claim 21 including the steps of:

actuating said base switch to cause said barrier to move to a closed position;

5 causing said controller to verify that at least one of said remote control units is out of a range to receive a signal from a remote transmitter of said at least one remote control unit; and

10 causing said controller to effect operation of said base transmitter to transmit at least periodic signals in search of said at least one remote control unit.

24. The method set forth in Claim 21 including the steps of:

5 causing said barrier to close in response to at least one of said remote control units moving out of range of a signal from said base transmitter.

25. The method set forth in Claim 21 including the steps of:

actuating said base switch to effect opening of said barrier;

5 causing said base transmitter to transmit a signal; and

causing said controller to maintain said barrier in an open condition as long as said controller receives a signal from at least one remote transmitter.

26. The method set forth in Claim 21 including the steps of:

causing said controller to effect closing of said barrier; and

5 ceasing transmission of signals from said base transmitter if said base receiver receives a signal from all of said remote control units.

27. The method set forth in Claim 21 including the steps of:

actuating said base switch to effect opening of said barrier; and

5 causing said controller to operate said base transmitter to transmit signals to said remote control units as long as any one of said remote control units is out of range for receiving a signal from said base transmitter.

28. The method set forth in Claim 21 including the step of:

causing said barrier to remain in an open position as long as one of said remote control units is within a

5 range of said base transmitter to receive signals therefrom.

29. The method set forth in Claim 21 including the step of:

causing said controller to effect closing of said barrier after a predetermined time commencing with opening
5 of said barrier if none of said remote transmitters are within a range to cause said base receiver to receive signals therefrom.